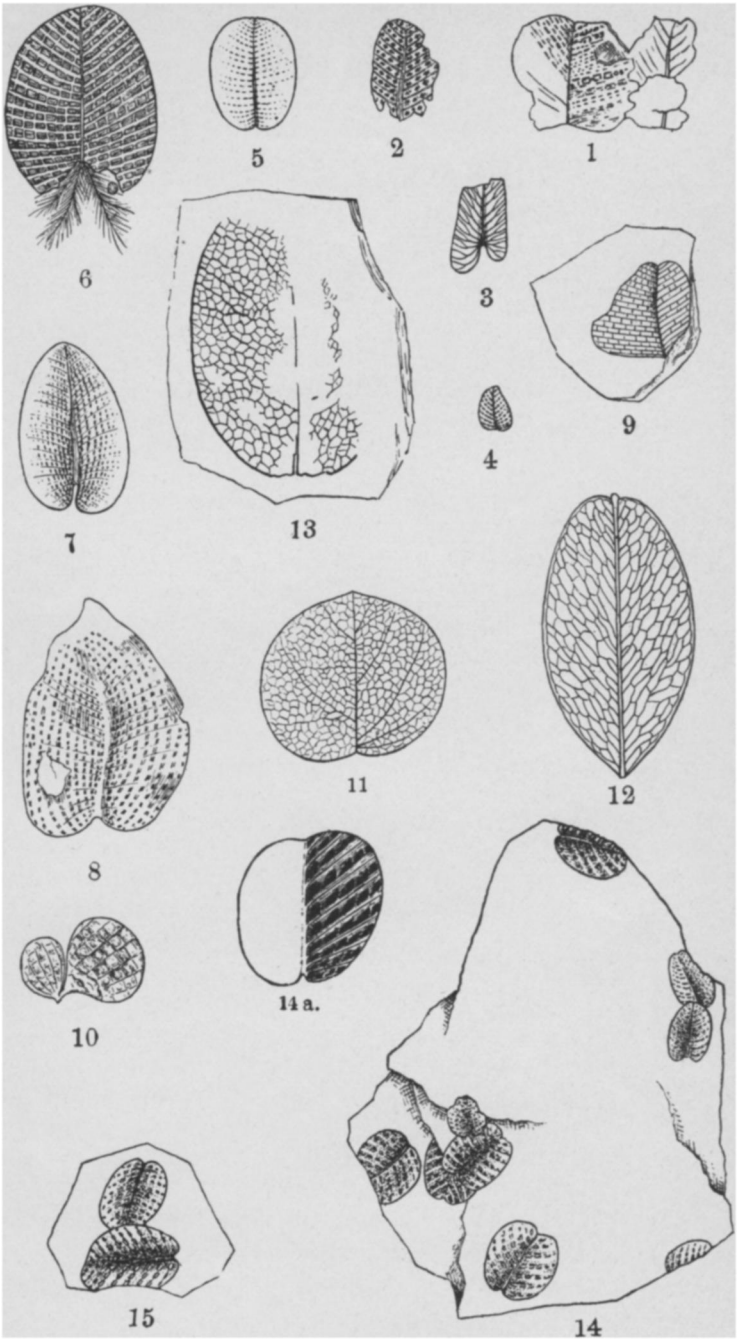

FOSSIL SALVINIAS.

Linum Sansabeanum Buckl. Proc. Acad. Phila. 1861, 450 (1861), according to Gray.

Sparingly pubescent, 1–2 dm. high, stems slender, wiry, much branched, decumbent or erect, the branches ascending. Leaves narrowly linear, 6–12 mm. long, 0.5 mm. wide, scattered, the upper minute; flowers solitary in the axils of the subulate upper leaves, secund, slender-pedicelled, the pedicels deflexed and 2–4 mm. long in fruit; calyx strigose-pubescent, the outer sepals about as long as the inner; capsule depressed-globose, 2 mm. in diameter.

Texas (Drummond, No. 19; Wright; Lindheimer, No. 16; Berlandier, Nos. 631, 1028, 2041, 2458; E. Hall, No. 31; Curtiss' N. A. Plants, No. 232; Sabine River, Leavenworth).

Fossil Salvinias, including Description of a new Species.

By Arthur Hollick.

(Plate 205.)

The genus *Salvinia* is represented in the flora of to-day by thirteen recognized species, which are, with the single exception of *S. natans* (L.) All., confined to tropical regions. This latter species is well known in Europe and Asia, and has been found or reported from four localities in North America, viz.: Western New York and Missouri (*fide* Gray's Manual, 6th Ed., 701 [1890]); Minnesota (Conway MacMillan, Bull. Torr. Bot. Club, 18: 13 [1891]); Southeastern New York (Thos. Craig, Proc. Nat. Sci. Assn. S. I., Oct. 14, 1893). In all these localities, however, the indications are that the plant was introduced, and that it is not native on this continent.

In the fossil state the genus has been well identified from recent geological horizons—upper cretaceous and tertiary—in Europe and America, and thirteen species have been described.*

* 1. *Salvinia reticulata* (Ettingsh. in part), Heer, Fl. Tert. Helvetiæ, 3: (1859), 156, *pl. 145, f. 16.* (*Dalbergia reticulata* Ettingsh. Beitr. z. Kenntniss d. Foss. Fl. v. Tokay, Sitzb. d. K. Akad. Wiss. Wien, Math.-Nat. Cl. 11: (1853), 813, *pl. 4, f. 5*).

2. *Salvinia Mildeana* Gœpp. Tert. Fl. v. Schossnitz in Schlesien (1855), 5, *pl. 1, f. 21-23;* Unger, Syll. Pl. Foss (1860), 5, *pl. 1, f. 7–10;* Ettingshausen, Foss. Fl. d. Tert.-Beck. v. Bilin, Denkschr. d. K. Akad. d. Wiss. Wien, Math.-Nat. Cl. 26: (1866), 94, *pl. 2, f. 23;* Heer, Miocene Baltische Fl. (1869), 17, *pl. 3, f. 1, 1b, 2.*

Ten of these are from Europe and three from America. It is doubtful if they should all be retained in the genus, but most of them are too well defined to admit of any doubt as to their botanical affinities.

The new species here described was recently brought to light while examining a quantity of undetermined material collected in 1883–'84, at Carbonado, Wash., by Mr. Edward Lorrance, under the direction of the late Professor J. S. Newberry. The specimens include about fourteen individuals, perfect and fragmentary, and upon some of them I found labels, in Professor Newberry's handwriting, with the name *Salvinia elliptica*, n. sp., which name I have retained. The best ones are figured in the accompanying plate, together with an enlargement to show the arrangement of the pits, and a figure of each of the other fossil species thus far described, for purposes of comparison. In this latter connection I wish to acknowledge my indebtedness to Professor Lester F. Ward, of the United States Geological Survey, for references to several species which I should have otherwise missed.

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3. *Salvinia formosa* Heer, Fl. Tert. Helvetiæ, l. c. *f. 13*, *13b*, *15;* Velenovsky, Fl. a. d. Ausgebr. Tert. Let. v. Vrsovic bei Laun (1881), 12, *pl. 1*, *f. 14–17;* Zittel, Handb. d. Palæontologie, 2: (1890) *f. 118* (*3*).

4. *Salvinia cordata* Ettingsh. Foss. Fl. d. Tert.–Beck. v. Bilin, l. c. *f. 19*, *20;* Zittel, l. c. *f. 118* (*1*).

5. *Salvinia Reusii* Ettingsh. l. c. *f. 21*, *22;* Zittel, l. c. *f. 118* (*2*).

6. *Salvinia Alleni* Lesq. Tert. Fl. (1878), 65, *pl. 5*, *f. 11;* Cret. & Tert. Fl. (1883), 136, *pl. 21 f. 10*, *11*. (*Ophioglossum Alleni* Lesq. Hayden's U. S. Geol. & Geog. Surv. Ann. Rept. (1872), 371).

7. *Salvinia cyclophylla* Lesq. Hayden's U. S. Geol. & Geog. Surv. Ann. Rept. (1873), 408; Tert. Fl. (1878), 64, *pl. 5*, *f. 10*, *10a*.

8. *Salvinia attenuata* Lesq. Hayden's U S. Geol. & Geog. Surv. Ann. Rept. (1874), 296; Tert. Fl. (1878), 65, *pl. 64*, *f. 14*, *14a*

9. *Salvinia Ehrhardti* Probst, Beschr. d. Foss. Pflanzenreste a. d. Molasse v. Heggbach O. A. Biberach etc. Jahresh. d. Ver. f. Vaterl. Naturk. i. Wurttemberg, 40: (1884), 74, *pl. 1*, *f. 3*.

10. *Salvinia excisa* Probst, l. c. *f. 4*.

11. *Salvinia spinulosa* Probst, l. c. 75, *pl. 1*, *f. 5*.

12. *Salvinia oligocænica* Staub, Aquitanische Fl. d. Zsilthales, Jahrb. d. K. Ungar. Geol. Anst. 7: (1887), 235 (15), *pl. 19*, *f. 2*, *2a*.

13. *Salvinia aquensis* Sap. Ann. Sci. Nat. 7e Ser. Bot. 7: (1888), 27, *pl. 2*, *f. 1*, *1a*, *1b*.

SALVINIA ELLIPTICA Newb.

Pl. 205, f. 14, 14a, 15.

Leaves small, $\frac{1}{2}$–$\frac{5}{16}$ in. long, $\frac{3}{8}$–$\frac{1}{4}$ in. wide, elliptical to almost orbicular in outline, cordate at base, more or less emarginate at apex; midrib well defined; surface marked with relatively large but few pits, arranged in rows, which radiate from the midrib at an acute angle upward.

Formation and locality: upper cretaceous (?) Carbonado, Washington.

This beautiful little *Salvinia* is clearly distinct from any species hitherto described. In outline the larger specimens do not differ much from *S. Mildeana* Goepp.*[2] (f. 5), and the smaller ones approach the forms of *S. cordata* Ettingsh.*[4] (f. 7), *S. formosa* Heer *[3] (f. 6) and *S. Ehrhardti* Probst. *[9] (f. 2), but from all of these it may be readily distinguished by its few large pits, as compared with the numerous small ones of the species mentioned. It is, perhaps, more nearly like the latter, all things considered. *S. spinulosa* Probst.*[11] (f. 4) is different both in size and shape, and the others offer no pretence for comparison whatsoever; in fact, we may well doubt whether some of these should be retained in the genus. The peculiar, reticulate nervation and absence of pit markings in *S. Alleni* Lesq.*[6] (f. 12), *S. reticulata* (Ettingsh. in part), Heer *[1] (f. 13) and *S. cyclophylla* Lesq.*[7] (f. 11), at once serve to separate them from all the others, and the latter is especially open to suspicion on account of its well defined midrib with irregular, pinnately arranged branches—a structure entirely foreign to the genus. It is significant that *S. reticulata* was originally described as a pod of *Dalbergia*, and *S. Alleni* as a leaf of *Ophioglossum*, while *S. cyclophylla* would not be described to-day as a *Salvinia*. All but the latter one of these three are, however, so very close in form, nervation and apex, to *Tmesipteris* Bernh., especially in the case of *S. Alleni*, that I wonder at their never before having been recorded in this connection.

S. oligocænica Staub*[12] (f. 1) and *S. aquensis* *[13] (f. 9) are too fragmentary and imperfect for exact comparison, but they appear to be more or less closely allied. *S. attenuata* Lesq.*[8] (f. 10) is unique, on account of its lack of any midrib, and the nervation which extends from base to summit. Were it not for the ap-

parent pit markings it would be strikingly like two lobes of a *Marsilea* leaf. *S. excisa* Probst *[10] (f. 3) seems undoubtedly to represent nothing more than a pinnule of some fern, probably an *Asplenium*.

In view of the above facts, the following rearrangement of the species seems advisable:

SALVINIA (Micheli) Schreb.

S. Mildeana Goepp. (1855).
S. formosa Heer (1859).
S. cordata Ettingsh. (1866).
S. Reusii Ettingsh. (1866).
S. Ehrhardti Probst (1884).
S. spinulosa Probst (1884).
S. oligocænica Staub (1887).
S. aquensis Sap. (1888).
S. elliptica Newb. (1894).

MARSILEA Linn.

M. ATTENUATA (Lesq.) = *Salvinia attenuata* Lesq. (1874).

TMESIPTERIS Bernh.

T. RETICULATA (Ettingsh. in part) = *Dalbergia reticulata* Ettingsh. (1853); *Salvinia reticulata* Heer (1859).

T. ALLENI (Lesq.) = *Ophioglossum Alleni* Lesq. (1872); *Salvinia Alleni* (1878).

PHYLLITES Sterub.

P. CYCLOPHYLLA (Lesq.) = *Salvinia cyclophylla* Lesq. (1873).

ASPLENIUM L.

A. EXCISA (Probst) = *Salvinia excisa* Probst (1884).

Explanation of Plate 205.

Fig. 1. *Salvinia oligocænica* Staub, Jahrb. K. Ungarn. Geol. Anst. 7: *pl. 19, f. 2.*

Fig. 2. *Salvinia Ehrhardti* Probst, Jahresh. Ver. Vaterl. Naturk. Württemb. 40: *pl. 1, f. 2.*

Fig. 3. *Salvinia excisa* Probst, l. c. *f. 4.*

Fig. 4. *Salvinia spinulosa* Probst, l. c. *f. 5.*

Fig. 5. *Salvinia Mildeana* Goepp. Ung. Syll. Pl. Foss. *pl. 1, f. 7.*

Fig. 6. *Salvinia formosa* Heer, Fl. Tert. Helvetiæ, 3: *pl. 145, f. 13.*

Fig. 7. *Salvinia cordata* Ettingsh. Foss. Fl. Tert.-Beck. Bilin, *pl. 2, f. 19.*

Fig. 8. *Salvinia Reusii* Ettingsh. l. c. *f. 21.*

Fig. 9. *Salvinia aquensis* Sap. Ann. Sci. Nat. 7e Ser. Bot. 7 : *pl. 2, f. 1.*

Fig. 10. *Salvinia attenuata* Lesq. Tert. Fl. *pl. 64, f. 14.*

Fig. 11. *Salvinia cyclophylla* Lesq. Tert. Fl. *pl. 5, f. 10.*

Fig. 12. *Salvinia Alleni* Lesq. Cret. & Tert. Fl. *pl. 21, f. 11.*

Fig. 13. *Salvinia reticulata* (Ettingsh. in part) Heer, Sitzb. K. Akad. Wiss. Wien, 11 : *pl. 4, f. 5.*

Figs. 14, 14*a*, 15. *Salvinia elliptica* Newb. (*f. 14a*=nat. size × 2).

On a Species of Helianthemum not recognized in our Text-Books.

By Eugene P. Bicknell.

Although but one species of *Helianthemum* is recognized in the flora of the Eastern States north of New Jersey, I am fully satisfied that two species inhabit the region, closely related species, it is true, but, as I shall hope to show, perfectly distinct plants. Singularly enough, the more common of these plants is the one which has been overlooked, at least the less common plant, as I have encountered the two about New York, is unmistakably the one mainly intended by our text-books under the name *H. Canadense* Michx., though in some descriptions it is evident that the two plants have been confused.

With recent writers the name *H. Canadense* Michx. has given place to *H. majus* (L.), B. S. P., the latter name being clearly available under the belief which has all along been entertained that there existed but a single Eastern species of the genus. Now, however, that a second species presents itself to be reckoned with, the question of the availability of the name *majus* revives under an entirely new aspect. Indeed there would seem to be a fair probability that the name *Canadense* will be found to hold for the plant of our text-books, and that the name *majus* will be available for the species here brought forward. This view is perhaps fairly inferable from the following considerations: It is, of course, well understood that the apetalous state of a *Helianthemum* was by Linnæus mistaken for a *Lechea* and named by him *Lechea major.* This name having priority in "Species Plantarum" over *Cistus Canadensis,* which it has always been taught was merely the earlier flowering stage of the same plant, has been adopted for the sup-